

SUBSTITUTE SPECIFICATION

STAMP DEVICE FOR PRINTING A PATTERN ON A SURFACE OF A  
SUBSTRATE

Field of the Invention

The present invention relates to a stamp device for printing a pattern on a surface of a substrate.

Background of the Invention

Soft lithography, a known technique for transferring micro patterns onto a surface of a substrate serving as the basic structure for integrated circuits, (see also Xia, Y.; Whitesides, G.M. Angew. Chem. Int'l. Ed. 1998, 37, 550) relies on a stamp to bring a reactant in contact with a substrate.

Stamp materials in soft lithography are exposed to capillary forces, self-adhesion, and mechanical stresses during printing. These stresses before or during printing can deform the stamp or cause parts of it to collapse, which leads to defective and inaccurate prints. Most of the work on contact printing has been done using Sylgard 184 manufactured by Dow Corning Corp., Midland, Michigan, USA, a commercially available thermo-cured Siloxane polymer, whose structures smaller than 1  $\mu\text{m}$  tend to merge or collapse during inking and printing (see also Biebuyck, H.A.; Larsen, N.B.; Delamarche, E.; Michel, B. IBM J. Res. Develop. 1997, 41, 159).

The diverging demands given by conformability, high pattern stability, small thermal or mechanical expansion, and runout cannot be met by one material alone but require layered structures. A practical method to compensate partially for insufficient dimensional and mechanical stability of polymeric materials is to mold the stamp polymer on top of a rigid glass backplane (see also the article of Biebuyck et al.